

## **THE FUTURE WORLD ORDER OUT OF TODAY'S CHAOS**

The growing chaos in the global economy, politics, information sector frightens by its scales and the feeling of global uncertainty. Economists have not managed to foretell the global financial crisis and can't say when the Great Stagnation that encompassed the leading countries of the world, will end. IT-pros riding the wave of boisterous social networks, gadgets and cryptocurrencies mushrooming, inflate financial bubbles of virtual companies' liabilities, generating either excitement or panic among the public taking the bait of crowdsourcing. Trained engineers are enthusiastic about universal robotics and automation, creating expectations of universal forcing factory and office workers out to the swamp of stagnant unemployment. Finally, futurologists are painting a gloomy picture of artificial intelligence's dominance, to which cinema workers add images of cyborgs, mutants and other monsters generated by bioengineering revolution. The public conscience is infected with depression and expecting the Apocalypse that is aggravated by the persistent aim of fiscal authorities to digitalize the whole population, giving a number to every individual.

On the whole, there are a lot of factors for a thinking man to go mad. Though there are more than enough common people, especially young people, who are not thinking but just riding the digitalization wave, and the general feeling of fright or worries about uncertainly of even the near future forms the socioeconomic climate in many countries of the world, including Russia.

In many but not all. Rapid, sustainable economic growth of China, India, countries on the Indochinese peninsular is accompanied by optimistic expectations and high spirits of the majority of South-East Asian population. There is no fear of the future in China ruled by communists, in democratic India, Moslem Malaysia, modern Singapore, the future there is created by the people of the said countries according to long-term plans with assuredness in their strength.

And there is quite a number of people in our country looking into the future with assuredness, enthusiastic about new technologies and successful in their

mastering. They make money on informatization, robotics, artificial intelligence, cryptocurrencies, swimming in the singularity environment like a duck takes to water, with this singularity frightening common people by its fantastic complexity and uncertainty.

Is it possible to find a foothold on the macroeconomic level for strategic planning that could allow not a small group of highly intellectual professionals but the society as a whole to find a way for sustainable development in growing chaos? Or just a foothold from which it is possible to see contours of the foreseeable future after this chaos?

The science of technological forecasting allows to foresee technologies' spreading, basing on the governing laws of the scientific and production cycle. The lifecycle of any technology is described by a logistic curve – like the lifecycle of any living creature or any educational process. This S-shaped curve is manifested in dynamics of all features of the scientific and production cycle – output of products, market share, efficiency, characteristics of products' quality<sup>1</sup>.

Most generally, approximately it is described by the logistic curve (fig. 1.1), determined by the following differential equation:

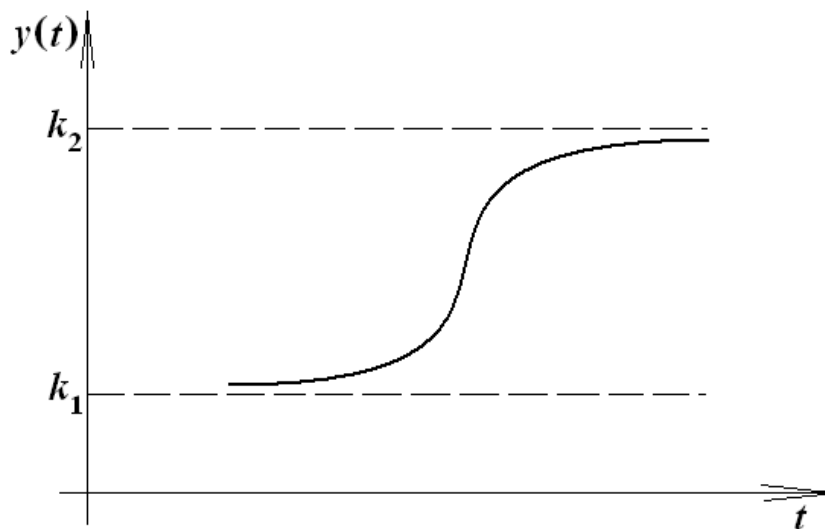
$$\frac{dy}{dt} = \alpha(y - k_1)(k_2 - y), \quad (1.1)$$

where  $t$  is an indicator of aggregate society's expenses for this technology's development (they can be time, money or any other resource spent);  $y(t)$  is a technologically significant result, achieved by this technology (it can also be expressed in natural or cost units),  $\alpha$  is a positive invariable ("scales" indicator), determining this curve's rate of rise,  $k_1$  and  $k_2$  are positive invariables limiting (from bottom and top respectively) the result of technology's functioning.

At the same time,  $k_1$  is the bottom of  $y(t)$ , expressing the original, starting, the lowest capabilities of the technology, and  $k_2$  is its technological limit characterizing its maximal capabilities.

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<sup>1</sup> Sahal D. Patterns of Technological Innovation. Moscow: Finances and Statistics, 1985.



**Fig. 1.1.** *Logistic (S-shaped) curve*

With the growth of costs (no matter the form they are measured) for mastering and perfection of this technology, its technologically significant result may only grow because  $y(t)$  is a function that is monotonously growing in the whole area of its determination.

The fact that the first derivative (growth rate) of  $y$  value, according to the equation (1.1), is in direct ratio to this value's removal from its original capabilities, means that  $y(t)$  grows as quickly as this gap increases. At the same time, the first derivative's being proportional to  $(k_2 - y)$  value means  $y(t)$  value's slowing down as it nears its top technological limit. Thus, as this value accumulates, it comes nearer and nearer to  $k_2$  value, and as the difference between them  $(k_2 - y)$  tends towards zero, growth rate  $y(t)$  also reduces to infinitely small values. Thus, we have growth with saturation meaning that growing value has its top limit, approaching which its growth slows down.

A logistic curve is a universal form of any technologies' lifecycle. The Pearl-Verhulst equations are used to describe this process mathematically: three-parameter symmetric logistic curve, positively shifted logistic curve, Gompertz function, modified exponential function, etc.<sup>2</sup>. Below are the formulae of the

<sup>2</sup> Tarde G. Les lois de l'imitation, etude sociologique. Sec. edition. P., 1985.

Verhulst logistic equation<sup>3</sup>, successfully used for description of population's bioprocesses dynamics:

$$dx/dt = \alpha x - \beta x^2, \text{ where } \beta = \alpha/K, \quad (1.2)$$

$\alpha$  is a general coefficient for population growth taking death rate into account,  $K$  is the maximum size population can achieve,  $x$  is population size,  $t$  is time,  $dx/dt$  is population growth rate.

This curve becomes a direct line on a logarithmic scale and that makes it a convenient tool for mathematical modeling. It is widely used in technological forecasting. With information about the original stage of technology's spreading (as a rule, it takes from 10% to 15% of the whole lifecycle from the moment it enters the sustainable growth stage), it's possible to forecast the whole trajectory of its development fairly reliably.

There are thousands of formal description examples as to technologies' spreading by empirical selection of logistic curve parameters<sup>4</sup>. Currently, technological forecasting is a developed sector of modern science that, in contrast to macroeconomic "mainstream", deals with real processes and is a reliable foothold for taking the right decisions in economy's management at the local level of individual technologies and focal areas of technologies' development.

Interaction of technologies is far from being limited by consecutive replacement of those becoming obsolete by new ones. None of these technologies exists in a vacuum, reproduction of any one of them supposes interlinking with other technologies, and development is accompanied by implementation of supplementing and perfecting innovations. When studying the governing laws of economy's technological development, it's required to present its structure in such a way as for the basic structural element not only to preserve its wholeness in the process of technological shifts but also to be a carrier of technological changes, i.e. for it not to demand further disaggregation for their description and measurement.

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<sup>3</sup> Given based on: Applied Forecasting for National Economy / ed. by V.V. Ivanter, I.A. Budanov, A.G. Korovkin, V.S. Sutyagin. Moscow: Economist, 2007. P. 362.

<sup>4</sup> Sahal D. Patterns of Technological Innovation. Moscow: Finances and Statistics, 1985.

We review *the aggregate of technologically interlinked industries – technological aggregate* as such an element. This technological aggregate takes shape as a reproducing wholeness of connected by “ins” and “outs” of technological processes, the products of which are mainly used inside the technological aggregate.

Technological interlinking of united into technological aggregate production processes brings about synchronization of their development. Organization, expansion, stabilization and decline of industries included into one technological aggregate take place more or less simultaneously. Origination of “chains” of new interlinked technological processes as a result of internal wholeness of technological aggregate means forcing out old ones, because of that any serious innovations inside a technological aggregate take the form of its reconstruction at a new technical platform that may signify origination of another technological aggregate.

That’s how groups of technological aggregates are made up, connected with one another closer than with the rest. Technological aggregates of all types tied into a reproducing wholeness by production cooperation, technologically adjusted to one another and being relatively at the same technical level, are included in such a group. Interlinked technological aggregates adjust to each other’s requirements in the process of their development; natural striving for stability of production environment by managing subjects makes technological ties between aggregates sustainable. Sustainable technological chains are being formed in economy, and they unite interlinked technological aggregates of various types, engaged in consecutive redistribution of some set of resources from mining to production of finished products.

Thus, we can single out groups of technological aggregates in the economy’s technological structure, the ones that are tied with each other by one-type technological chains and forming reproducing entireties – *technological patterns*. Each of these patterns is a whole and sustainable formation, with a closed cycle within it, including mining and obtaining original resources, all stages of their

treatment and processing, and output of a set of final products, satisfying the respective type of public consumption. According to the classical definition, *technological patterns are groups of aggregates of technologically interlinked industries, singled out in the structure of economy, tied to each other by one-type technological “chains” and forming reproducing entireties. Each of such patterns is a sustainable formation with internal unity, within which a full macroproduction cycle takes place, including mining and obtaining original resources, all stages of their treatment and processing, and output of a set of final products, satisfying the respective type of public consumption*<sup>5</sup>.

A technological pattern (TP) reviewed in the dynamics of functioning, is a reproduction contour<sup>6</sup>, containing the aggregate of developing and synchronously reproducing basic technologies. In statics, it can be determined as the aggregate of close in technical level industries, i.e. as the economic level<sup>7</sup>.

A technological pattern is formed within the framework of the whole economic system, encompassing all stages of resources' treatment and processing, and the respective type of non-production consumption, forming the *macroeconomic reproduction contour*. Thus, each technological pattern is a self-reproducing wholeness, as a result of which economy's technical development cannot take place in a different way from consecutive change of technological patterns. Each one's lifecycle forms the content of the respective stage of technical and economic development.

The lifecycle of a technological pattern on the surface of economic phenomena is reflected in the form of a “long wave” of economic situation with phases, corresponding to the stages of this cycle. The depression phase corresponds to the origination stage of the respective technological pattern, the animation phase

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<sup>5</sup> Glazyev S. Methods for Evaluating Dynamic Characteristics of Scientific and Technological Progress / Proceedings of the Academy of Sciences of the USSR, Economics series, 1985. No. 1; Scientific discovery “The governing law for technological patterns change in the process of global and national economies development” (registration certificate No. 65-S issued by the International Academy of Authors of Scientific Discoveries and Inventions).

<sup>6</sup> Danilov-Danilyan V.I., Ryvkin A. A. The Reproduction Aspect of Economic Development and Some Problems of Management // Economy and Mathematical Methods. 1982. V. XX, issue 1.; Glazyev S. Scientific and Technological Process and Reproduction Structures in National Economy. Preprint. Moscow: Central Economics and Mathematics Institute of the Academy of Sciences of the USSR, 1986.

<sup>7</sup> Yaremenko Yu.V. Structural Changes in Socialist Economy. Moscow: Mysl, 1981.

corresponds to establishment stage, the “long wave” rise phase to the growth stage, the recession phase to its maturity stage characterized by exhaustion of possibilities for further economic growth, continuation of which becomes possible after transfer to a new technological pattern.

The growth phase of a new technological pattern is accompanied by not only reduction of production costs taking place especially quickly when its reproduction contour is formed, but also restructuring of economic evaluations in accordance with the conditions of its reproduction. The change of prices ratio helps to enhance the efficiency of technologies making up a new technological pattern, and when the traditional technological pattern is forced out to enhance the efficiency of the whole public production. Most vividly these changes are manifested in fluctuations of prices for energy resources that take place from time to time – rapid increase of these prices launches reduction of the domineering technological pattern’s efficiency and the process of its replacement by a new one that is more effective. As the latter grows, energy output of public production reduces, the demand for energy resources falls, prices for them decrease as well as prices for energy-intensive materials and raw materials, and that creates favourable environment for renewal of economic growth based on a new technological pattern.

Change of dominating technological patterns is mediated by structural global economic crises. Exactly this kind of crisis is taking place now with typical for this period fluctuations of prices for energy resources, financial “bubbles”, economic depression. The “surge” of oil prices and prices for other energy resources that took place in the early 21<sup>st</sup> century certifies that the technological pattern which dominated till recently has achieved its growth limits. The structural crisis is being overcome now thanks to the growth of a new technological pattern. Its key focal areas have already been defined: biotechnologies based on achievements of molecular biology and genetic engineering, nanotechnologies, additive technologies<sup>8</sup>, artificial intelligence systems, global information networks and

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<sup>8</sup> Additive (coming from English “to add”) technologies are the process of layer-after-layer synthesis of the object’s material from the 3D-model data: the item as if grows from the material stored in the printer. They were named in contrast to subtractive production technologies, to wit, mechanical treatment. The advantages of additive

integrated high-speed transport systems. Flexible production automation, space technologies, production of construction materials with previously set characteristics, nuclear industry, air carriage will be further developed. Growth of nuclear power industry and natural gas consumption will be supplemented by expansion of hydrogen use as an environmentally friendly energy resource, application of recycled energy sources will be considerably expanded. Production will become even smarter, there will be a transfer to continuous innovative process in most sectors and continuous education in most professions. Transfer from the “consumer society” to “intellectual society” will be completed, and demands for the quality of life and comfort of the habitat will be most important in it. The production sphere will transfer to environmentally friendly and waste-free technologies. Information, educational, medical services providing reproduction of human capital will be most important in the structure of consumption.

Change of dynamics of the new technological pattern’s key industries allow to state that it goes through the “birth” phase and will enter the growth phase in the new future. They expand at the rate of about 35% per year, making up technologies of a new “long wave” of economic growth<sup>9</sup>. The biggest activity in mastering new technologies is witnessed in solar power, robotics, lighting technology, laser, information, bioengineering technologies. Public health becomes the biggest sector thanks to revolution in medicine that takes place based on cellular technologies. The second sector in size is education as it is required to regularly retrain personnel with the growth of life span, education becomes continuous.

Thus, basing on the long-term technical and economic development theory with development as the process of establishment and change of technological patterns, it’s possible to forecast technological trajectories of economic development for 2-3 decades. Timely development of key industries of the new technological pattern forms comparative advantages that will determine

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technologies are improved characteristics of finished goods, a lot of raw materials saved, possibility to create geometrically complex items. According to data by the Ministry of Industry and Trade of the Russian Federation published in *Expert* journal, No. 24, 2017 (Article “Technology for Future Use”), about 600-650 industrial 3D-printers are used in Russia now, with only about 10% of them being additive machines working with metal powders.

<sup>9</sup> Nanotechnologies as the Key Factor for the New Technological Pattern in Economy / Ed. by S.Yu. Glazyev, V.V. Kharitonov. Moscow: Trovant, 2009.



geo-economic rivalry up to the middle of the 21<sup>st</sup> century. Transfer to it takes place via another technological revolution, essentially enhancing efficiency of the key areas of economy's development. Production cost and the cost computer employment based on nanotechnologies will reduce by another order of magnitude, the volumes of these means application will increase many times because of their becoming miniature and adjusted for certain consumer needs. Medicine will get technologies to fight diseases at the cellular level, supposing exact targeted delivery of medicines to damaged sections of the body in minimum amounts and with maximum use of body capabilities for regeneration. Nanomaterials have unique consumer characteristics created for a certain target, including for many times increase of durability, wear-resistance, reliability of products created from them. Transgenic cultures decrease costs many times, increase efficiency and improve consumer qualities of pharmaceutical and agricultural production. Genetically modified microorganisms will be used to extract metals and pure materials from mining raw, revolutionizing chemical and metal industries. Assembly automated complexes and 3D-printers capable to assemble any macroscopic objects according to the copied in advance or worked out three-dimension grid of atom arrangement, are created in machine building based on the "nanocomputer-nanomanipulator" system. Opportunities for prevention and human life span prolongation are significantly expanded in medicine after development of nanomedical robots and cellular technologies.

Discovery of the governing law for the periodic system of technological patterns creates the scientific basis for formation of national economy's development strategy<sup>10</sup>. In particular, the outrunning development strategy for Russian economy based on accelerated growth of the new technological pattern. The outrunning development strategy was worked out taking into account transfer of the new technological pattern into the growth phase and the condition of

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<sup>10</sup> Scientific discovery by S.Yu. Glazyev "The governing law for technological patterns change in the process of global and national economies development" (registration certificate No. 65-S issued by the International Academy of Authors of Scientific Discoveries and Inventions, with the Russian Academy of Natural Sciences as the academic supervisor).

Russian economy, this strategy stipulates for the priority importance of the new technological pattern's industries growth based on activating the existing scientific and technological potential. Exactly in such a period, when technological patterns change, there are opportunities for backward countries for a spurt to the forefront of economy's development. This requires concentration of resources in the new technological pattern's industries. It's also necessary to stimulate innovative activities for dynamic overcoming of backwardness in such industries where lagging behind the advanced global level is insignificant. And finally, in case of hopelessly backward industries, outrunning development strategy is necessary based on import of technologies and foreign investments embodying the advanced technological level. Bringing such mixed outrunning development strategy into life requires stimulating demand for new products, including via public procurement as well as providing financing for new technologies growth by long-term affordable loans.

Proceeding from the priority of the new technological pattern's outrunning growth and Russian economy's modernization based on it, there are offers prepared taking into accounts its capabilities for realizing the state policy for the economy's outrunning development<sup>11</sup>. They include development of the system of strategic and indicative planning, long-term loaning mechanisms for the growth of the new technological pattern's promising industries, forms of public-private partnership in achieving the set modernization aims and economy's growth based on advanced technologies. At the same time, managerial methods corresponding to the new technological pattern should be taken into account. This includes automated design systems that together with marketing technologies and technological forecasting allow to transfer to automated management for the whole product's lifecycle.

Forecasting structural changes brought about by TP change allows to determine the priority focal areas of the economic development policy. Forced

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<sup>11</sup> Glazyev S. Russia's Outrunning Development Strategy in the Global Crisis Environment. Moscow: Economy, 2010.

increase of investments into their bringing into life gives an opportunity to switch economy into the outrunning development mode, where new industries growth will compensate decrease of business activities in outdated technological aggregates of the old TP. And conversely, ignoring this opportunity dooms economy to technological lagging behind and degradation.

Sustainable trends can be revealed not only in the technological area but also in the institutional area behind the seemed chaos, basing on the governing laws hypothesis as to the global economic patterns change.

G. Arrighi<sup>12</sup> in his historical research presents periods of capitalism development as a sequence of systemic century-long capital accumulation cycles. He singles out Spanish-Genoan, Dutch, English and American cycles according to the names of countries leading in the course of the respective cycle and setting forth the pattern for arrangement of capital reproduction, each of them took about one hundred years. In his opinion, currently the world is on the threshold of a new century-long capital accumulation cycle. The center of global economic development shifts to Asia after the American century-long cycle, and China there shoots forward.

According to the hypothesis we're proceeding from, the basis of each century-long capital accumulation cycle is the lifecycle of respective global economic pattern, which we defined as *the system of interrelated international and national institutions providing economy's reproduction and determining the mechanism of global economic relations*. The change of century-old capital accumulation cycles takes place as a result of ending the lifecycle of respective global economic pattern and establishment of a new one. They can be also defined as managerial systems for economy's development with typical for each of them structure of power and economic relations.

The leading country's institutions are of the key importance for formation of the power and economic relations structure of each global economic pattern, and these institutions have a predominant impact on international norms, regulating the

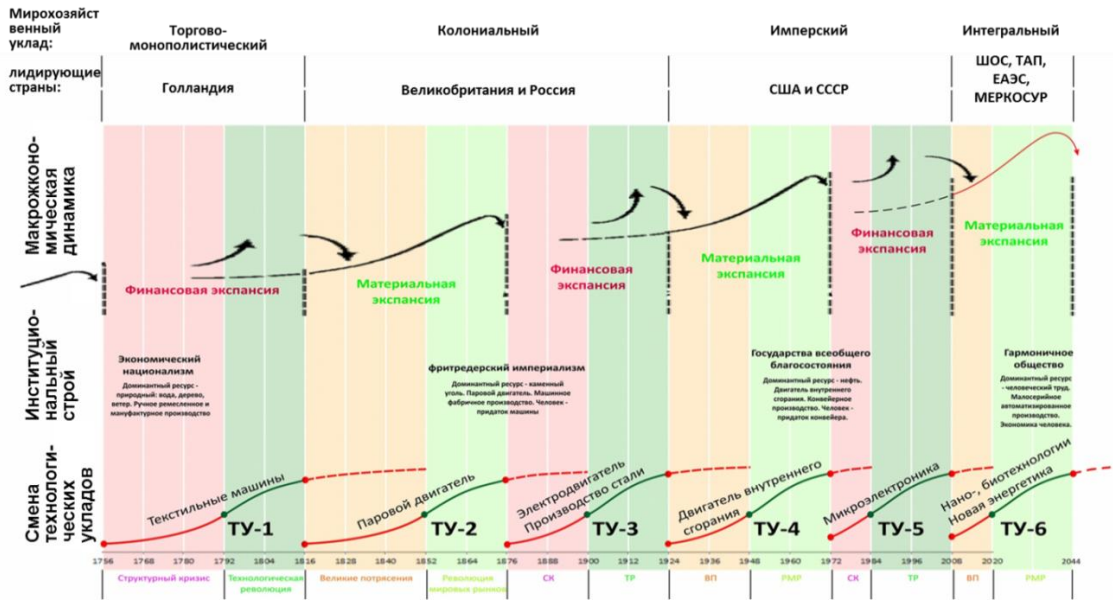
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<sup>12</sup> Arrighi G. The long twentieth century: money, power and the origins of our times. London: Verso, 1994.

world market and international trade, economic and financial relations. Each such pattern has its growth limits determined by accumulation of internal contradictions within the framework of reproduction of the institutions included in it. The said contradictions are developed till the moment the system of international and political relations is destabilized, and until now it was always solved by world wars. The latter were organized and provoked by the losing its domineering positions leading country of the becoming outdated global economic pattern for strengthening control over the global economy's periphery in order to strengthen its competitive advantages and weaken positions of possible rivals. However, a new leader always appeared out of the latter – a carrier of a more progressive system of institutions and production relations, that until recently avoided taking part in the war, in order to join it at the final stage among the winners and take the global leadership.

The use of the “pattern” idea is intended for reflecting the reproducing wholeness of interrelated elements: connected by technological cooperation industries (technological pattern) and united by institutions economic formations (global economic pattern). The connection of elements predetermines synchronization of their lifecycles at least in the maturity and decline phase as well as fitful character of economic development, in which a simultaneous change of a big number of elements takes place from time to time, acquiring the intermittent character of technological (in case of technological patterns change) or social (in case of global economic patterns change) revolutions.

See fig. 2 for the historical diagram of century-long capital accumulation cycles and respective global economic patterns, named for the purpose of discussion according to the type of the system of international trade and economic relations dominant at the time.



<b>слева таблицы по вертикали:</b>	Global economic pattern:
Мирохозяйственный уклад:	
Лидирующие страны:	Leading countries:
Макроэкономическая динамика	Macroeconomic dynamics
Институциональный строй	Institutional system
Смена технологических укладов	Technological patterns change
<b>Сверху таблицы по горизонтали</b>	Trade and monopolistic
Торгово-монополистический	Holland
Голландия	
Колониальный	Colonial
Великобритания и Россия	United Kingdom and Russia
Имперский	Imperial
США и СССР	USA and USSR
Интегральный	Integral
ШОС, ТАП, ЕАЭС, МЕРКОСУР	SCO, TAP, EAEU, MERCOSUR
Финансовая экспансия	Financial expansion

Материальная экспансия	Material expansion
<p>Экономический национализм</p> <p>Доминантный ресурс – природный: вода, дерево, ветер. Ручное ремесленное и мануфактурное производство</p>	<p>Economic nationalism</p> <p>Dominant resource – natural: water, wood, wind. Handicrafts, domestic industries and manufactures.</p>
<p>Фритредерский империализм</p> <p>Доминантный ресурс - каменный уголь. Паровой двигатель. Машинное фабричное производство. Человек – придаток машины</p>	<p>Free-trade imperialism</p> <p>Dominant resource – coal. Steam engine. Machine production at factories. Humans are additions to machines.</p>
<p>Государства всеобщего благосостояния</p> <p>Доминантный ресурс - нефть. Двигатель внутреннего сгорания. Конвейерное производство. Человек – придаток конвейера.</p>	<p>Welfare states</p> <p>Dominant resource – oil. Combustion engine. Assembly-line production. Humans are additions to assembly-lines.</p>
<p>Гармоничное общество</p> <p>Доминантный ресурс - человеческий труд. Малосерийное автоматизированное производство. Экономика человека</p>	<p>Harmonious society</p> <p>Dominant resource – human labour. Small-serial computer-aided production. Economy of humans</p>
Текстильные машины	Textile machines
Паровой двигатель	Steam engine
<p>Электродвигатель</p> <p>Производство стали</p>	<p>Electric motor</p> <p>Steel production</p>
Двигатель внутреннего сгорания	Combustion engine
Микроэлектроника	Microelectronics
Нано-, биотехнологии	<p>Nano-, biotechnologies</p> <p>New energy</p>

Новая энергетика	
Структурный кризис	Structural crisis
Технологическая революция	Technological revolution
Великие потрясения	Great upheavals
Революция мировых рынков	World markets revolution
СК	Structural crisis
ТР	Technological revolution
ВП	Great upheavals
РМР	World markets revolution
ТУ	ТР

**Fig. 2. Periodic change of global economic patterns**

(Source with amendments by the author: Ayvazov A. The Periodic System of Global Capitalism Development / *Development and Economy* almanac. March 2012. No. 2)

A. Ayvazov's periodic system presented in fig. 2 combines periodization of technological patterns and systemic capital accumulation cycles that are replacing one another. It is based on generalization of the Nikolay Kondratyev's long wave theory and G. Arrighi's systemic capital accumulation cycles. It follows from the periodic system that in 2008 the world entered the phase of "Great upheavals" in the process of which the systemic accumulation cycles will change and the leader of global economic development will change as well. The world is entering the Asian systemic capital accumulation cycle, in which the main role in providing economy's growth belongs to the state. And the neoliberal "free play of market forces" that has been dominant till the present time, will be replaced by strengthening state interference in economic life, state indicative planning and strict economy's regulation by state and supranational authorities, integrating activities of various social groups and economic agents proceeding from national interests.

Recovery from the current crisis will be accompanied by large-scale geopolitical and economic changes. As it usually happens, the countries dominant within the framework of the existing global economic pattern, demonstrate inability for essential institutional innovations that could channel the capital becoming available into structural economy's restructuring based on the new technological pattern, going on with reproduction of the established institutional system and servicing economic interests embodied in it. Meanwhile, the unrolling structural restructuring of global economy related to transfer to the new technological pattern, gives backward countries an opportunity for an economic



“spurt” to the leading countries’ level, while the latter have to deal with capital’s over-accumulation in outdated industrial and technological complexes.

China and other South-Eastern countries are “spurting” like that now. Over the three recent decades, the People’s Republic of China achieved impressive success. From the far-outlying districts of global economy China stepped into its leaders, in 2014 taking the first place in the world in the GDP physical volume and export of high-tech products. GDP increased 30 times in China over the three decades (from US\$ 300 billion to US\$ 9 trillion at the current yuan-dollar exchange rate), output of industrial products increased 40-50 times, foreign currency resources increased hundreds of times (from several dozens of billions of dollars to US\$ 4 trillion). If we take economic development measured in GDP per capita, China rose from the place in the end of the poorest countries list to the place in the first thirty average-income countries<sup>13</sup>.

China is becoming the world engineering and technological center. The share of Chinese engineering, technical and research personnel in the global numbers came up to 20% in 2007, doubling in comparison with 2000 (1,420 and 690 thousand, respectively). According to forecasts, there will be 15 mln of engineering, technical and research personnel by 2030 in the world, with 4.5 mln (30%) of them being scholars, engineers and technicians from the People’s Republic of China<sup>14</sup>. China will take the first place in the world by 2030 in R&D expenditures, and its share in global expenditures will amount to 25%<sup>15</sup>.

India, Indonesia, countries on the Indochinese peninsular demonstrate outrunning development rates at the same time with China. They form the “nucleus” of the new, integral global economic pattern. In contrast to the countries from the “nucleus” of the current global economic pattern that forced the universal system of financial and economic relations on the world as the basis of liberal globalization,

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<sup>13</sup> Prospects and Strategic Priorities of BRICS Rise / Ed. by V. Sadovnichy, Yu. Yakovets, A. Akayev. Moscow State University – Pitirim Sorokin and Nikolay Kondratyev International Institute – Institute for Economic Strategies – National Committee for BRICS Research – Institute of Latin American Studies of the RAS, 2014.

<sup>14</sup> China — 2030: Forward to General Prosperity / Center for Studies of the State of Affairs in the Country at the Tsinghua University / Ed. by Hu Angang, Yan Yi-Long, Wei Xing. Beijing: People’s University of China, 2011. P. 30.

<sup>15</sup> Sadovnichy V., Yakovets Yu., Akayev A. Op. cit. 2014.

the forming “nucleus” of the new global economic pattern differs by big variety. This special feature is manifested in principles of international relations shared by the countries included in it: freedom of choices as to ways of development, rejection of hegemony, sovereignty of historical and cultural traditions. The new global economic pattern is formed on the basis of equality, mutual advantages and consensus. New regional economic associations are established on these principles – Shanghai Cooperation Organization, European Economic Community, MERCOSUR (Southern Common Market), ASEAN (Association of Southeast Asian Nations) – and international financial institutions (BRICS Development Bank and the pool of foreign currency resources, Asian Infrastructure Investment Bank, Eurasian Development Bank).

A new global economic pattern’s formation entails reformation of the global economic order and international relations. Revival of socioeconomic development planning and state regulation of the main indicators of capital’s reproduction, active industrial policy, control over transborder capital flows and foreign currency limitations – all that turns from the prohibited by Washington financial organizations “menu” into generally accepted tools of international economic relations. A number of scholars are speaking about the Beijing Consensus as a counterweight for the Washington Consensus, with the first one being much more attractive for emerging countries, in which the majority of the mankind lives<sup>16</sup>. It bases on the principles on non-discrimination, mutual respect of sovereignty and national interests of cooperating states, focusing them not on servicing international capital but rise of the people’s standard of living. At the same time, a new order for intellectual property rights protection and transfer of technologies may originate, approval of new international trade norms in power engineering and resources is probable, as well as new rules of international migration, new agreements on harmful emissions’ limitations may be signed, etc.

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<sup>16</sup> Ramo J.C. The Beijing Consensus. The Foreign Policy Centre, 2004; The Beijing Consensus: An alternative approach to development. World Foresight Forum. The Hague, The Netherlands, 2011. Issue Brief No. 02.

Both neighbouring countries – Russia, India, Vietnam, Malaysia, Indonesia – and African and Latin American countries pull up to the forming “nucleus” of the new global economic pattern. In aggregate, the economic power of the said states is already comparable with the countries from the “nucleus” of the American accumulation cycle. They also have common elements that can play the role of a kind of channel for capital transfer from one accumulation cycle to another – Japan, Singapore and South Korea. Notwithstanding considerable differences of the People’s Republic of China in political arrangement and economy’s regulation mechanisms, many sustainable cooperation ties are being formed between them, mutual trade and investments are growing rapidly.

Independent of the dominant form of ownership – state as in China or Vietnam, or private as in Japan or South Korea – combination of state planning institutes and market self-organization, state control over the main indicators of economy’s reproduction and free entrepreneurship, the common good ideology and private initiative are typical for the integral global economic pattern. However, political arrangement forms may be principally different – from the biggest in the world Indian democracy to the biggest in the world Communist Party of China. The priority of national interests over private interests stays unchanged and is expressed in strict mechanisms of citizens’ personal responsibility for good behaviour, precise performance of their obligations, observance of laws, serving national aims. The system of socioeconomic development management is built on mechanisms of personal responsibility for the rise of the society’s standards of living.

The primacy of public interests over private interests is expressed in the typical for the global economic pattern institutional structure of economy’s regulation. First of all, in state control over the key indicators of capital’s reproduction by mechanisms of planning, crediting, subsidizing, price forming and regulation of basic conditions for entrepreneurship. Moreover, the state not orders as much as performs the moderator’s role, forming mechanisms of social partnership and interaction of the main social groups. Officials are not trying to

rule entrepreneurs but arrange joint work of business, academic, engineering communities for forming common development ideas and working out methods for bringing them into life. In their turn, entrepreneurs enter the profit maximization and enrichment motive into ethical norms protecting the interests of the society. The use of enterprising activities institutions expands, and they are focused not on profit maximization but socially important results – setting up and development of non-governmental organizations, development institutes, Islamic and Russian Orthodox banking. Ethical norms are taken into account in money flows management and there are limitations introduced against financing criminal and amoral activities. State economy's regulation mechanisms are also tuned to that.

The state provides long-term and cheap loans and businessmen guarantee their targeted use in certain investment projects for production development. The state provides access to infrastructure and natural monopolies' services at low prices, and enterprises are responsible for production of competitive products. The state arranges and finances the required R&D, education and training of personnel, and entrepreneurs bring innovations into life and invest in new technologies. Public-private partnership is subordinate to the public interests of economy's development, rise in the people's standard of living, improvement of the quality of life. The ideology of international cooperation is changing respectively - the global liberalization model in the interests of global financial oligarchy is replaced with the sustainable development paradigm in the interests of the whole mankind. The role and importance of money, around accumulation of which in the hands of the ruling elite of dominant states all century-long capital accumulation cycles revolved, change as well. Money in the new global economic pattern becomes the tool for providing economy's reproduction and development in public interests.

Russia that as a part of the USSR was included in one of the two nuclei of the imperial global economic pattern, found itself on the fringes of the American capital accumulation cycle after the USSR disintegration. Respectfully, the weight of Russian economy in world economy decreased. After losing the reproducing wholeness, Russian economy can't form the nucleus of the new global economic

pattern, in-building into the Asian capital accumulation cycle as a raw material outlying district. Theoretically, Russia can still enter the nucleus of integral global economic pattern as the leading country of the Eurasian Economic Union, if it manages to master its institutions in time as well as create basic technological aggregates of the new technological pattern.